

What is claimed is:

1. A method of identifying a path of travel for a packet in a multi-area domain operated according to a link state routing protocol, comprising the steps of:

receiving topology information from a plurality of individual areas in a domain;

identifying a plurality of intra-area least cost paths from the topology information;

and

assembling a subset of the plurality of intra-area least cost paths into an end-to-end path between a starting address and a destination address.

2. The method of claim 1 wherein each least cost path comprises a series of routers and links or networks between routers.

3. The method of claim 1 wherein the identifying step comprises:

identifying at least one exit point from a first area through which the destination address is reachable;

constructing at least one least cost path segment within the first area between the starting address and at least one of the exit points; and

selecting at least one of the least cost path segments to result in at least one selected first area least cost segment.

4. The method of claim 3 wherein the exit point from the first area is the destination address.

5. The method of claim 3 wherein the identifying step further comprises:

for at least one of the exit points associated with at least one of the selected least cost path segments, identifying a second area within the domain to which said at least one exit point is connected;

identifying at least one exit point from the second area through which the destination address is reachable;

constructing at least one least cost path segment within the second area between the at least one exit point of the first area and at least one exit point of the second area; and

selecting at least one of the least cost segments within the second area to result in at least one selected second area least cost segment;

and wherein the assembling step comprises connecting one of the selected first area least cost segments and one of the selected second area least cost segments.

6. The method of claim 5 wherein the exit point of the second area is the destination address.

7. The method of claim 5 wherein the second constructing and selecting steps are repeated for one or more additional areas, and wherein the assembling step comprises connecting the least cost segments for all areas for which said steps have been performed.

8. The method of claim 3 wherein the identifying step further comprises identifying all exit points from the first area through which the destination address is reachable.

9. The method of claim 5 wherein

each constructing step comprises constructing all possible least cost path segments;

and

the assembling step comprises connecting a plurality of the least cost path segments between the starting address and the destination address.

10. A computer-readable carrier containing instructions thereon that are capable of instructing a computing device to perform the steps of:

receiving topology information from a plurality of individual areas in a multi-area routing domain;

identifying a plurality of intra-area least cost paths from the stored topology information; and

assembling a subset of the plurality of intra-area least cost paths into an end-to-end path between a starting address and a destination address.

11. The carrier of claim 10 wherein each least cost path comprises a series of routers and links or networks between routers.

12. The carrier of claim 10 wherein the instructions relating to the identifying step comprise instructions that instruct the computing device to:

identify at least one exit point from a first area through which the destination address is reachable;

construct at least one least cost path segment within the first area between the starting address and at least one of the exit points; and

select at least one of the least cost path segments to result in at least one selected first area least cost segment.

13. The carrier of claim 12 wherein:

the instructions relating to the identifying step further comprise instructions that instruct the computing device to:

for at least one of the exit points associated with at least one of the selected least cost path segments, identify a second area within the routing domain to which said at least one exit point is connected;

identify at least one exit point from the second area through which the destination address is reachable;

construct at least one least cost path segment within the second area between at least one of the exit points of the first area and at least one of the exit points of the second area; and

select at least one of the least cost segments within the second area to result in at least one selected second area least cost segment; and

the instructions relating to the assembling step comprise instructions to connect one of selected first area least cost segments and one of the second area least cost segments.

14. The carrier of claim 13 wherein the instructions further comprise instructing the computing device to repeat the second constructing and selecting steps for at least one additional area, and wherein the instructions relating to the assembling step instruct the computing device to connect the least cost segments for all areas for which said steps have been performed.

15. A method of storing historical routing information in a routing domain operating according to a link state routing protocol, comprising the steps of:

storing a plurality of routing events advertised in a routing domain as they are received over time;

identifying a set of time instants for which a complete context of routing and topology information of the routing domain will be maintained;

at each time instant identified in the identifying step, constructing at least one time-stamped routing information context by storing data structures representing current topology and routing state of the routing domain; and

for each of the time-stamped routing information contexts, constructing a time ordered list of routing events as the events are received over time until the next time instant identified in the identifying step.

16. The method of claim 15, wherein the routing domain comprises a multi-area routing domain, the time-stamped routing information contexts are logically partitioned through the separate storage of information pertaining to each area in the routing domain, and where the constructing step comprises constructing a separate time ordered list of routing events for each area in the routing domain.

17. A method of identifying of path information in a routing domain operating according to a link state routing protocol, comprising:

storing a plurality of routing events advertised in a routing domain as they are received over time;

identifying a set of time instants for which a complete context of routing and topology information of the routing domain will be maintained;

at each time instant identified in the identifying step, constructing at least one time-stamped routing information context by storing data structures representing a current topology and routing state of the routing domain;

for each of the time-stamped routing information contexts, constructing a time ordered list of routing events as they are received over time until the next time instant identified in the identifying step;

specifying a starting point in the routing domain, a destination address in the routing domain, a starting time, and an ending time;

reviewing the time-stamped routing information contexts to identify the context having a time stamp that is latest yet still precedes contexts with a time-stamp preceding the starting time;

constructing at least one updated time-stamped routing information context by sequentially processing routing events from the time ordered list of routing events associated with the time-stamped routing information context until reaching the last routing event having a time-stamp that precedes the starting time; and

constructing path information between the starting point and the destination address using the updated time-stamped routing information context.

18. A method of identifying a path between a starting address and a destination address in a routing domain operated according to a link state routing protocol, comprising:

specifying an ordered list of routing events;

providing a routing information context representing a starting topology and a routing state of a routing domain;

constructing path information between a starting address and a destination address using the routing information context;

updating the routing information context in accordance with a next routing event in the ordered list of routing events; and

repeating the constructing and updating steps above until reaching a last routing event in the ordered list of routing events.